

# The semantics of nominals <sup>1</sup>

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## 1 Nouns and noun phrases

### 1.1 The scope of this chapter

This chapter deals with the semantics of nouns and noun phrases and the complex apparatus of semantic operations that build NPs out of nouns. It will not examine predicative NPs and generic NPs, as both would require extra discussion. Also, the chapter will disregard those aspects of NPs that relate them to their sentential context. These include linking means such as case, scope properties of NPs (see chapter 20) and the role of NPs in the information structure of the sentence.

### 1.2 The nominal onion

The discussion will be organized by following the functional layers of an NP, a structure that I have dubbed the 'nominal onion' elsewhere (Löbner 2013: 90). The functional structure is not identical with the syntactic structure of the NP, although it is often reflected in it to some degree. Rather, the NP has an internal structure of functional layers that presuppose each other in a certain order from the nucleus to the outside.

- Nuc** The core of the structure is the **nucleus**, an expression of the lexical category N, or a lexical full NP such as a proper name or a personal pronoun in English.
- Rel** The **Relation** layer serves the specification of a relation between the noun referent and some correlate, e.g., a possessor. Relation specifications at the nucleus are implemented by possessive affixes, possessor complements and other means. In addition, a language may have possessor specifications on the Definiteness layer (e.g., left possessives in English such as *his book*, *Ed's book*).
- Qual** The **Quality** layer adds restrictive attributes to the nucleus, typically by means of adjectives, relative clauses or adjoined adverbials.
- Unit** The **Unit** layer serves the formation of countable units or complex sums for reference. Grammatical number, numeral classifiers and measure terms belong to this layer.
- Qt** The **Quantity** layer specifies the quantity of the referent(s) by using numerals or vague quantity specifications such as *much*, *many*, *several* or *a few*.
- Ord** The **Ordering** layer locates the referent relative to others with respect to some ordering; it employs expressions such as *next*, *last*, *following*, ordinal numerals and superlatives.

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**Def** The **Definiteness** layer marks the nominal as definite or indefinite. Adnominal demonstratives, articles, (in)definiteness affixes and determiner possessives belong here.

**Qf** The **Quantification** layer proper applies after determination. It produces a quantifying NP with scope, to interact with a predication in a particular way. The layer employs operators such as *every*, *each*, *all* or *both*. Plain quantity specification on the layer Qt is not subsumed here.

A similar structure for functional NP layers is assumed in Rijkhoff (2002:218–231): Quality, Quantity (including our Unit and Quantity) and Location (comprising Relation and Definiteness). Rijkhoff (2002) does not mention Order and Quantification proper as layers in their own right. He deals with ordinal numerals in his Quantity layer, and quantifiers proper are not discussed. Van Valin (2008) applies a similar system. He treats Rel as the topmost layer of Nucleus, to which also restrictive Qual operators apply. The Unit layer, called 'nominal aspect', operates on the Nucleus, establishing the NP layer of 'Core'; our Qt operations number and quantity specification operate on Core, along with negation; definiteness and deixis apply to the NP layer (our Def); the layers Ord and Qf are not mentioned.

I disagree with Generalized Quantifier Theory (Barwise and Cooper 1981 and a lot of following work, see chapter 20): GQT disregards the layered structure of the NP by considering all NPs, including proper names, pronouns, bare NPs, indefinites and definites as cases of quantification. In this chapter, the notion of quantification is restricted to what I am calling 'quantification proper' (see 3.7).

For the sake of convenience, I will refer to all layers except Quality as 'determination', as I did in Löbner (2011). Note that the Definiteness layer (with capital D) comprises both definiteness (with lower case d) and indefiniteness. The layers of determination are ordered by relative scope, as will become clear in the discussion to follow. Following Abbott (2010), I refer to the level to which Def applies as 'CNP' ('common noun phrase'); the levels resulting from Def and Qf are referred to as 'NP'.

Nominal nuclei are subject to conceptual distinctions in three independent dimensions: relationality, countability and inherent uniqueness. They will be distinguished by three features  $[\pm R]$ ,  $[\pm C]$  and  $[\pm U]$ , respectively. These features are not immediate meaning components, but describe conceptual properties of nominal meanings. The features do not only apply at nucleus level. Rather, they carry through to the NP level. Passing through the machinery of determinational operations, these features may or may not change. In fact, the main function of determinational operations is to manipulate these characteristics of nominals. The Rel layer manipulates the feature  $[\pm R]$ , Unit and Qt work on  $[\pm C]$ , Def and Qf on  $[\pm U]$ .

## 2 The Nucleus

When dealing with lexical meaning, one has to keep in mind that almost all nouns are polysemous, with more than one lexicalized meaning variant (see chapter 15). It is tacitly presupposed in the following that whenever we talk of 'nouns', we actually relate to nouns in a particular lexical meaning variant. In addition, the compositional contribution of the nucleus

noun to a complete NP may differ from its lexical meaning, due to meaning shifts coerced by NP internal operations, or later in the sentential or discourse context.

We will not treat lexical properties of the nucleus such as gender, noun class or other lexical classifications, as these do not bear on the semantics of the determinational mechanisms to be discussed.

## 2.1 Relationality

The distinction between **relational nouns** (*daughter*) and **absolute nouns** (*girl*) is a conceptual distinction. Relational nouns have a referential argument and in addition one or more relational arguments. We will confine the discussion here to nouns with one relational argument. With *my daughter*, the relational argument is specified as the speaker, while the speaker's daughter is the referential argument. Relational concepts describe their referents in terms of a criterial relationship to a correlate; in addition, the concept may add sortal characteristics to the description of the referent and/or the correlate. The relationships between referent and correlate(s) are manifold, as witnessed by examples such as *daughter* (kinship), *head* (body part), *boss* (social relation), *baggage* (being carried), *birth* (event), *name* (verbal correlate), *age* (property), etc.

The referent of an NP with a relational nucleus can only be determined if the correlate is specified, or retrieved from context, or if the relational concept is shifted to an absolute concept. Explicit specification of the relational argument usually takes the form of a possessive construction, whence we will refer to the correlate as the 'possessor'.

Absolute noun concepts describe their potential referents independently of any correlates to be specified. The description may involve implicit correlates, but these are not necessary for fixing the referent. The majority of common nouns are absolute. To see the difference, consider the minimal pair ›daughter‹ (relational) and ›female person‹ (absolute). The two concepts have the same extension; however, a 'female person' is a female person by virtue of properties she has in her own right; a 'daughter' is a daughter only by virtue of standing in a child-relationship to a parent.

We will use the descriptive feature [+R] for relational nouns and [–R] for nonrelational nouns.

## 2.2 Countability

The discussion of the distinction between mass and count nouns, and mass and count NPs, is very complex. For the purpose of this chapter, the following essentials are crucial.

**The distinction is conceptual.** The mass-count distinction, again, applies at the conceptual level: there are mass concepts and count concepts. At the Nuc level, this distinction is a dichotomy, notwithstanding polysemy (e.g., *stone* has both mass and count senses). At the NP level, nouns of either lexical type may have count as well as mass uses, due to shifts during NP formation. The same ontological entities may be described with mass concepts and with count concepts. For example, the count concept ›hair<sub>count</sub>‹ defines its referents as single threads of hair, while the mass concept ›hair<sub>mass</sub>‹ refers to the total body of hairs (on the scalp) constituting a physical object with properties like density or a particular haircut. Plural *hairs<sub>count</sub>* may refer to the same as *hair<sub>mass</sub>*.

**Count concepts are integrative.** The referents of count concepts are conceived of as bounded wholes. These wholes may be complex and consisting of constitutive parts, but the parts will not themselves be in the extension of the concept. Examples of nouns with count concept meanings are *pebble* (no constitutive parts), *student* (body part mereology), *piano* (an artefact with a complex mereology of constitutive parts, such as keys and strings) or *orchestra* (a group of musicians playing together on instruments). Count concepts are 'integrative' predicates with respect to their referential argument.

- (1) A predicate *p* is INTEGRATIVE with respect to a given argument *x*  
iff it is true/false of it as an integral whole. (Löbner 2000:237)

Something is a 'pebble' or not iff it is so as a whole object; a group of people is an orchestra or not iff it is so as a whole, functioning as a group to make music together as one body of sound. There may happen to be members of the group which form another, smaller orchestra, but this fact would be independent of the question whether or not the whole group is an instance of 'orchestra'.

**Mass concepts are summative.** Mass concepts are not integrative; they denote some kind of homogeneous matter in the widest sense, to be taken as something consisting of parts of the same description as the whole referent. Mass concepts are 'summative' predicates about their referential argument. A summative predicate is true of an argument iff it is true of all elements of some partition of *x*, where a partition is a set of parts that add up to the whole.

- (2) A predicate *p* is summative with respect to a given argument *x*  
iff: *p* is true/false for *x* iff there is a partition of *x* such that *p* is true/false for every part in it. (Löbner 2000:237)

Note that 'parts' are restricted to parts *within the domain of the predicate* because the predicate has to be applicable to the parts; the domain *D(p)* of a predicate is the set of things for which the predicate returns a truth value, either TRUE or FALSE. Due to summativity, the referents of mass nouns are not conceived of as bounded, whence mass concepts fail to define units of reference. There may or may not be minimal elements in *D(p)*. For example, the domain of ›furniture‹ consists of whole objects and collections of whole objects that can be said to be a piece, or pieces, of furniture; of these, the single objects are minimal, and a collection of such objects is a potential referent of *furniture* iff each such object is a piece of furniture. Material parts of pieces of furniture, like legs of chairs, are not within the domain of the noun. Other mass predicates do not conceive of their referents as consisting of minimal parts, e.g., ›water‹, ›air‹ or ›poison‹. Yet other concepts may contain a criterion of granularity and of the particles the matter consists of, cf. ›rice‹, ›sand‹, ›garbage‹, ›hair<sub>mass</sub>‹. Even so, with this type of mass concept, the particles will not matter individually, they will just form a 'mass'. The difference between the types of mass concept represented by ›water‹, ›sand‹ and ›furniture‹ will not matter for determination as discussed below.

**Plural count concepts are summative.** Plural count concepts are summative, too. The referents of a plural count noun are sums of potential referents of the singular noun. Due to the summativity of plural count concepts, the major distinction is between integrative singular concepts, henceforth 'singular concepts', on the one hand and summative mass or plural concepts on the other.

**The mass-count distinction in Mandarin.** Mandarin is a language that lacks grammatical number marking as well as definite and indefinite articles (Li and Thompson 1981: 104–131). A bare NP can therefore have definite or indefinite singular, plural or mass reference. Also, all nouns can only combine with a numeral when a classifier is added to it. It has therefore been argued that all nouns in Mandarin are mass nouns. This, however, is due to a confusion of the lexical level Nuc and the syntactic level NP. We follow Cheng and Sybesma (1999) in assuming that, at the Nucleus level, Mandarin nouns are either count or mass, due to their respective lexical meaning. The equivalents of count nouns in languages such as English, e.g., *fángzi* 'house', are lexically count, integrative concepts. When used as bare NPs, they are number-neutral NPs and hence present a *summative* description of the (possibly complex) NP referent: the description fits its referent iff it fits all the singular instances of the concept that make up the referent. As will be argued below, plural reference of Mandarin count nouns is the result of applying a 'sums' operation  $\Sigma$  that remains morphologically unmarked.

**The features [C] and [Pl].** The three groups of nouns discussed can be distinguished by means of two descriptive binary features. The countability feature [C] directly corresponds to integrativity, [Pl] to plurality. As [+Pl] entails [–C] (plurals are summative), the combination [+C][+Pl] is excluded; thus, there are three classes of concepts at level Nuc:

- (3)
- |                                                    |                                                                     |
|----------------------------------------------------|---------------------------------------------------------------------|
| types of nominal concepts in terms of [C] and [Pl] |                                                                     |
| [–C][–Pl]                                          | mass concepts: <i>water, sand, poison, furniture</i>                |
| [+C][–Pl]                                          | singular concepts: <i>house, Mandarin fángzi 'house', orchestra</i> |
| [–C][+Pl]                                          | plural concepts: <i>houses, people</i>                              |

In classifier languages such as Mandarin, there are at least two properties that distinguish count nouns from mass nouns: count nouns combine with different classifiers (count classifiers as opposed to mass classifiers, 3.3); in addition, they allow integrative predication that relates to singular referents in their denotation. (4) illustrates the relevance of the [ $\pm$ C] distinction for the application of the integrative predicate ›small‹:

- (4)
- |    |      |                                                                     |
|----|------|---------------------------------------------------------------------|
| a. | [+C] | small house, small houses, xiǎo fángzi [Mandarin, 'small house(s)'] |
| b. | [–C] | § small water, § small sand                                         |

### 2.3 Inherent Uniqueness

Some types of concept are inherently unique in that they describe their referents as something that is uniquely determined in the given situation. Examples are concepts such as ›sun‹ (in the sense ›sun round which the earth orbits‹), unique-role concepts like ›pope‹ (in the sense ›head of the Roman Catholic Church‹), concepts for institutions such as ›main station‹ and concepts for givens like ›weather‹ (in a given context of utterance, which includes a particular place and time) or ›date‹ (day, month and year). Being inherently unique is not necessarily a matter of the richness of conceptual content. A minimal pair of a unique and a nonunique concept are the Japanese noun *otoko* for male persons, children or adults, and the pronoun *kare* 'he' that is used for persons only. The two concepts have the same descriptive content, but differ in *kare* being inherently unique. In logical terms, their meanings can be distinguished as follows:

- (5)
- |    |        |                                                      |
|----|--------|------------------------------------------------------|
| a. | ›kare‹ | $\iota x (\text{person}(x) \wedge \text{male}(x))$   |
|    |        | 'the unique x such that x is a person and x is male' |

- b.  $\lambda x (\text{person}(x) \wedge \text{male}(x))$   
'is a person and male'

We will include personal pronouns and proper names into the discussion because they may partake in determination processes such as definiteness marking. Proper names are considered concepts of a form like the following for a person's name:

- (6)  $\lambda x (\text{person}(x) \wedge \text{name}(x) = \text{Liza})$

We will use the descriptive feature [+U] for inherently unique nouns. While [+U] nouns have exactly one referent in a given context (if the context supports the existence of a referent), [-U] concepts may have any number of referents, none, one, or more.

The [U] feature is independent of the [R] feature. In accordance with Löbner (2011), I use the following terminology for nouns, and concepts in general:

- (7) Conceptual types

	[-U] nonunique	[+U] unique
[-R] nonrelational	sortal concept	individual concept
[+R] relational	relational concept	functional concept

In the context of this twofold opposition, 'relational (in the narrower sense)' means 'relational and nonunique'. Functional concepts are relational and inherently unique. They are functional because they provide a function in the mathematical sense that, for any appropriate type of situation, returns exactly one referent for every possessor. There are four semantic subclasses of functional nouns: correlate concepts ( $\lambda x \lambda y (\text{mother}(x, y))$ ,  $\lambda x \lambda y (\text{king}(x, y))$ ); part concepts (e.g. body part terms), unique property concepts ( $\lambda x \lambda y (\text{temperature}(x, y))$ ,  $\lambda x \lambda y (\text{price}(x, y))$ ,  $\lambda x \lambda y (\text{size}(x, y))$ ,  $\lambda x \lambda y (\text{colour}(x, y))$ ) and related event concepts ( $\lambda x \lambda y (\text{birth}(x, y))$ ,  $\lambda x \lambda y (\text{end}(x, y))$ ,  $\lambda x \lambda y (\text{invention}(x, y))$ ).

The [U] and [R] distinctions are both independent of the countability distinction. These are mass nouns of the four types: *water* [-U][-R], *air* [+U][-R], *baggage* [-U][+R] and *skin* [+U][+R].

### 3 The layers of determination

#### 3.1 Relation

The Relation layer deals with the [R] feature of the NP. Nominal nuclei start out as either [-R] or [+R], but argument NPs necessarily end up as [-R], because [+R] means an open possessor argument, which would preclude determining the referent of the nominal. One exception is NP-external possessive constructions that contain an unsaturated relational noun, such as the 'raised possessor' construction in (8):

- (8) German (Germanic, Indo-European)  
 ich habe mir [*raised possessor*] das Bein [+R] gebrochen  
 I have 1SG.DAT DEF leg broken  
 'I have broken my leg'

The Relation layer hosts operations that take [-R] to [+R], [+R] to [+R] and [+R] to [-R]. We will introduce the matter by discussing Relation in Koyukon, an Athabaskan language spoken in Alaska. Unlike English, Athabaskan handles relationality and absoluteness in a very transparent way. The discussion is based on Thompson (1996).

### 3.1.1 Relation in Koyukon

In Koyukon, relational nouns can only be used with a possessor specification or a derelationalizing affix (9a). A possessor can be specified by a preceding NP (9b) or a possessor prefix (9c). If the noun *kkaa'* is to be used absolutely, just referring to a foot without relating it to its possessor, Koyukon uses the prefix *k'e-* (9d). Both, possessor specification and derelationalization, take the nucleus from [+R] to [−R].

(9) Koyukon (Thompson 1996: 666 f.)

- |                                                    |                                                        |                                                               |
|----------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------|
| a. <i>*kkaa'</i><br>foot                           | b. <i>gguh kkaa'</i><br>rabbit foot<br>'rabbit's foot' | c. <i>ne- kkaa'</i><br>2SG- foot<br>'your <sub>SG</sub> foot' |
| d. <i>k'e- kkaa'</i><br>DEREL-foot<br>'a/the foot' |                                                        |                                                               |

The semantic effect of derelationalization is existential saturation of the possessor argument. The general mechanism is this:

(10) derelationalization:

$$[+R] \lambda x \lambda y R(x,y) \rightarrow [-R] \lambda x \exists y R(x,y)$$

If an absolute noun is to be used with a possessor specification, it first has to be shifted to [+R] with a relationalizing suffix *-e'*. The suffix takes, for example, [−R] ›dog‹ to [+R] ›dog of‹; possessor specification takes that concept back to [−R] ›[possessor]'s dog‹ (11b,c).

(11) Koyukon (Thompson 1996: 655)

- |                       |                                                          |                                                     |
|-----------------------|----------------------------------------------------------|-----------------------------------------------------|
| a. <i>leek</i><br>dog | b. <i>Dick leeg- e'</i><br>Dick dog- REL<br>'Dick's dog' | c. <i>se- leeg- e'</i><br>1SG- dog- REL<br>'my dog' |
|-----------------------|----------------------------------------------------------|-----------------------------------------------------|

For relational nouns that have been taken to [−R], secondary possession is possible. In such cases, *k'e-* is prefixed to the result of the first shift to [−R], resulting in re-establishing [+R] for the nucleus; a possessor prefix is then added to the result:

(12) Koyukon (Thompson 1996: 667)

- |                                                                                |                                                                                 |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| a. <i>ne- k'e- gguh kkaa'</i><br>2SG- REL- rabbit foot<br>'your rabbit's foot' | b. <i>ne- k'e- k'e- kkaa'</i><br>2SG- REL- DEREL foot<br>'your [animal's] foot' |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------|

Koyukon reveals two important points: (i) relational nouns are in need of possessor saturation for referential use; (ii) possessive constructions with [−R] nouns require a preceding step of relationalization, i.e., a shift from [−R] to [+R]; (i) then applies to the result. In English, the same semantic operations are at work in the corresponding constructions even though they are not overtly expressed. Thus, English ›my foot‹ in the sense of Koyukon *ne-k'e-k'e-kkaa'*, too, is the result of three [R] operations: (1) derelationalizing ›foot‹ by existential saturation of the semantic possessor argument, (2) adding a pragmatic relation to a new possessor, (3) specifying the new possessor as the speaker.

Koyukon belongs to a wide range of languages that mark possession with [+R] and [−R] concepts in different ways. The phenomenon is known as (in)alienability splits. So-called 'inalienable possession' occurs with [+R] nouns; 'alienable' possession is applied to [−R]

nouns. As a rule, the expression of inalienable possession is morphosyntactically less complex. The examples from Koyukon illustrate this point: [+R] nouns immediately take possessor specifications by juxtaposition (9b) or prefix (9c), whereas [−R] nouns receive an additional relationalizing affix (11b,c). For an overview on (in)alienability, see Chapell and McGregor (1996).

Whereas for [+R] nouns the relation of the referent to the possessor is written into their meanings, [−R] nouns do not provide the possessive relation; rather it has to be retrieved from context and world knowledge. For possible readings of English genitive constructions, see Vikner and Jensen (2002).

### 3.1.2 Operations of the Relation layer

**From [−R] to [+R]: relationalization.** The only productive mechanism of this type is relationalization as discussed in (11) and (12) above. In Koyukon, it is realized by *k'e-*; in English it is covert.

**From [+R] to [+R]: relational possessor.** If a [+R] nominal receives a possessor specification, the open possessor argument is replaced by the possessor concept. The possessor specification may itself be [+R]. This may give rise to possessive chains such as in (13). A possessive chain is completed only if a [+R]-to-[−R] operation is applied, e.g., if a [−R] possessor is added, or derelationalization applied, to the last element.

(13) the secretary [+R] of the head [+R] of the department [+R] of ...

**From [+R] to [−R] (1): absolute possessor.** The main operation that turns a [+R] nominal into [−R] is the specification of the possessor argument, e.g., by a possessive affix, a [−R] possessor NP or a possessive determiner. Possessive affixes (cf. (11c) and (12)) specify a [+U] possessor in the same terms as personal pronouns, e.g., person and number. Possessor NPs combine with the nucleus (14a), the CNP (14b) or the NP as a whole (14c):

- (14) a. N: wife of John  
 b. CNP: John's two kids  
 c. NP: (Mandarin, Sino-Tibetan)  
       wǒ de zhè xiē dòng xiǎo fángzi  
       I GEN DEM PL CLS little house  
       'these my little houses'

A fourth alternative is possessive determiners, as in English or Italian:

- (15) a. my friend  
 b. una mia amica (Italian, Romance, Indo-European)  
       INDEF.F 1SG.POSS.F friend  
       'a [female] friend of mine'

In Italian, the possessive determiner just specifies the possessor, leaving definite or indefinite determination open; the possessive operates at a level lower than CNP. English Saxon genitives and possessive determiners lead to definite determination for referential NPs (this does not hold for predicative NPs, see Löbner 2011: 304f); like articles, they operate at the level of CNP. This is a widespread phenomenon still waiting for an explanation: if a possessor specification is grammatically complementary with definiteness marking, the interpretation is



definite (Haspelmath 1999). In the languages concerned, these possessives have a combined function on the Rel and Def layers. We will deal with them in 3.6.

**From [+R] to [-R] (2): existential possessor.** A second mechanism of shifting [+R] to [-R] is derelationalization by existential saturation of the possessor argument, as discussed in (9b) and (10). In English, this operation is covert, in Koyukon it is overtly realized with the derelationalization prefix *k'e*.

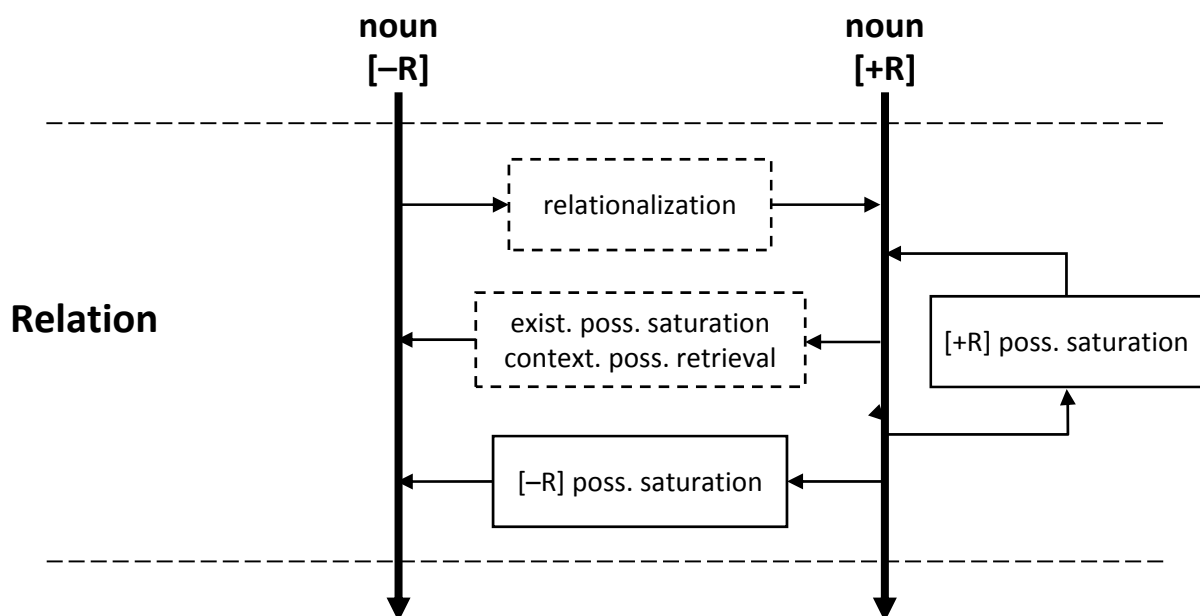
**From [+R] to [-R] (3): contextual possessor.** There is a third mechanism, found with associative anaphora, such as *the author* in (16):

(16) This is an interesting book. By the way, I happen to know the author.

Here, the possessor is determined anaphorically, or more generally, it is retrieved from context. Note that in this case the implicit possessor is definite.

**The overall picture.** The diagram in Figure 1 displays the possible operations; elements with dotted lines around them represent semantic operations that, depending on the type of language, may be covert. Bypassable operations are optional. Thus, a [-R] or [+R] nucleus may pass through the Rel layer without semantic change. [+R] possessor saturation may be iterated. This figure and those to follow are to be read as a flow diagram; any sequence of operations is possible that results from following lines in the direction of the arrows.

**Figure 1** Operations of the Relation layer



### 3.2 Quality

The primary function of the Quality layer is to add a property or specification to the nucleus concept. Quality operators are attributes that take the form of adjectives, adjoined adpositional phrases or relative clauses. At this level, the attributes are applied immediately to the nucleus. They are restrictive. Nonrestrictive attributes apply at higher levels of the nominal and will not be considered. 'Establishing relative clauses' will be dealt with on the Def layer in 3.6.1.

Being restrictive, Quality attributes require a [-U] nucleus that allows for alternative referents. If a restrictive attribute is applied to a [+U] nucleus, the noun needs to be shifted to [-U]. Consider two possible readings of (17):

(17) Obama is a popular president.

The functional concept ›president‹ has a possessor argument and a time parameter, by default the evaluation time  $t_e$ , as in (18a,c). In one reading of (17), the possessor argument is retrieved from context and fixed as the US; in order to enable the comparison required by the concept ›popular‹, the time parameter of ›president‹ is existentially saturated, yielding [-U] status for the resulting meaning ›president<sub>1</sub>‹ in (18b) meaning ›president of the US at some time‹; as a result, Obama is compared in popularity to former US presidents. In another reading, Obama may be compared to contemporary presidents of other countries; the possessor argument is existentially saturated, again yielding [-U] status.

- (18) a. ›president‹       $\lambda x \lambda y (x = \text{president}(y, t_e))$   
       b. ›president<sub>1</sub>‹     $\lambda x \exists t < t_e (x = \text{president}(\text{US}, t))$   
       c. ›president<sub>2</sub>‹     $\lambda x \exists y (x = \text{president}(y, t_e))$

There are attributes that transfer [-U] to [+U] concepts; these will be discussed on the Order layer. [-U] to [-U] operators can be applied repeatedly. They form a loop on [-U] concepts. I will not discuss restrictions on the order of adjectives, nor the different ways in which restrictive adjectives interact with the nominal (see Demonte 2012, Hole 2015:s.4 and Svenonius 2008 for recent surveys).

### 3.3 Unit

The discussion here is aimed at covering the Unit and Quantity layers in English as a typical number language and Mandarin as a typical classifier language. All operations on the Unit and Quantity layers require the operand to be [-U] in order to allow for an open number of referents. If a quantity specification is to be applied to a [+U] concept, it has to be shifted to [-U] first; for example, the functional concept ›president‹ would have to undergo a shift like one of those in (18b,c) in order to allow for the interpretation of ›three presidents‹.

The Unit layer primarily serves to allow the manipulation of the [C] feature. There are three basic operations: sums formation, application of a count classifier and application of a mass classifier.

**From [ $\pm$ C] to [-C]: sums.** The sums operation  $\Sigma$  takes a concept N to the concept  $\Sigma N$  for sums of referents of N. The result is a summative concept and hence [-C], independent of the [C] feature of the operand. Applied to [+C] nominals it yields plural concepts. They will be marked plural in English, but are mostly left unmarked in Mandarin (except for personal pronouns). Covert  $\Sigma$  application is responsible for the number neutral quality of bare count NPs in Mandarin.  $\Sigma$  on [+C] nouns produces [+Pl] concepts. The [Pl] feature will bear on the Quant, Def and Qf layers. Plural concepts are eligible to another (covert) application of  $\Sigma$  and, being [-C], to mass classification. Examples of double  $\Sigma$  and of  $\Sigma$  applied to mass nominals will be discussed below in 3.7.

**From [+C] to [+C]: count classifiers.** Count classifiers, also called 'sortal' classifiers, are applied to [+C] concepts such as Mandarin *fángzi* 'house' to form [+C][-Pl] concepts. They

are integrative predicates that define a unit of counting, where the unit coincides with a potential referent of the nucleus concept. The classifier may add features such as shape or social meaning to the nominal concept. Thai has a great number of 'repeaters' (Allan 1977:292f). These are count classifiers identical to the classified noun; Allan (1977:292) quotes Thai *khon si-khon* ('people 4-CLS-for-people'). These cases show that the essential function of a count classifier is to restrict the nominal to singular reference, rather than *creating* a unit. For languages with restricted number marking, count classifiers are functional as singularizers, a prerequisite for applying numerals. In number languages such as English, the singularizing step would not be functional; singular is expressed by the singular form of the noun which is in opposition to its plural form. Classifiers in Mandarin are not only used in combination with numerals, but also with demonstratives, to indicate singular reference.

Allan (1977) gives a survey of semantic types of classifiers. Among the most frequent count classifiers are 'material' classifiers for [+C] categories of objects, such as ›human‹, ›small animal‹, ›vessel‹, and shape classifiers such as ›longish‹ (1-dimensional), ›flat‹ (2-dimensional), ›round‹ (3-dimensional). Many classifier languages have a general count classifier; in Mandarin it is *gè* 个.

**From [−C] to [+C]: mass classifiers.** Mass classifiers, misleadingly also called 'massifiers', take concepts of type [−C][±PI] to [+C][−PI]. Mass classifiers are integrative predicators. A mass classifier supplies a boundary criterion for the separation of referents. These operators include classifiers for shapes of loose aggregates (›heap‹, ›bunch‹, ›flock‹), shapes of coherent quanta (›loaf‹, ›piece‹, ›puddle‹), containers (›box‹, ›bag‹, ›bowl‹), action-related quanta (›mouthful‹, ›shovel‹) and measures (›inch‹, ›acre‹, ›litre‹, ›gram‹, ›kilowatt‹, ›hour‹, etc.). For the application to [+PI] concepts there are classifiers for pairs (*shuāng*), groups (*bāng*), rows (*pái*), piles (*duī*), etc. Most of them can also be used for mass nouns. English has mass-to-count shifts such as the portion shift underlying the count use of the mass noun *beer* in *she only had one beer for breakfast*. Such shifts function as covert mass classifiers. Some measure classifiers like ›cup‹ derive from concepts for containers by multiple steps of abstraction. For a case study of this process in Russian, see Partee and Borschev (2012).

### 3.4 Quantity

There are two kinds of quantity specifications available, vague quantity specifications (vagQ) and cardinal numerals. Unlike numerals, vagQ like *much/many* do not require unit formation. In number languages like English, there will be a distinction between vagQ for [−PI] and [+PI] numerals: *much, little, a bit* etc. are applied to [−PI], *many, (a) few* and *several* are used for [+PI]; there are also vagQ used for both, e.g., *more, most* and *some*. In classifier languages like Mandarin, no such distinction is to be observed.

Numerals apply after unit formation, which is either lexical (English) or effected by the application of a classifier. In Mandarin, the classifier is attached to the numeral and both precede the noun:

- (19)      sān    dòng     xiǎo     fángzi  
             3       CCLS   small   house                                  [CCLS count classifier]  
             'three small houses'

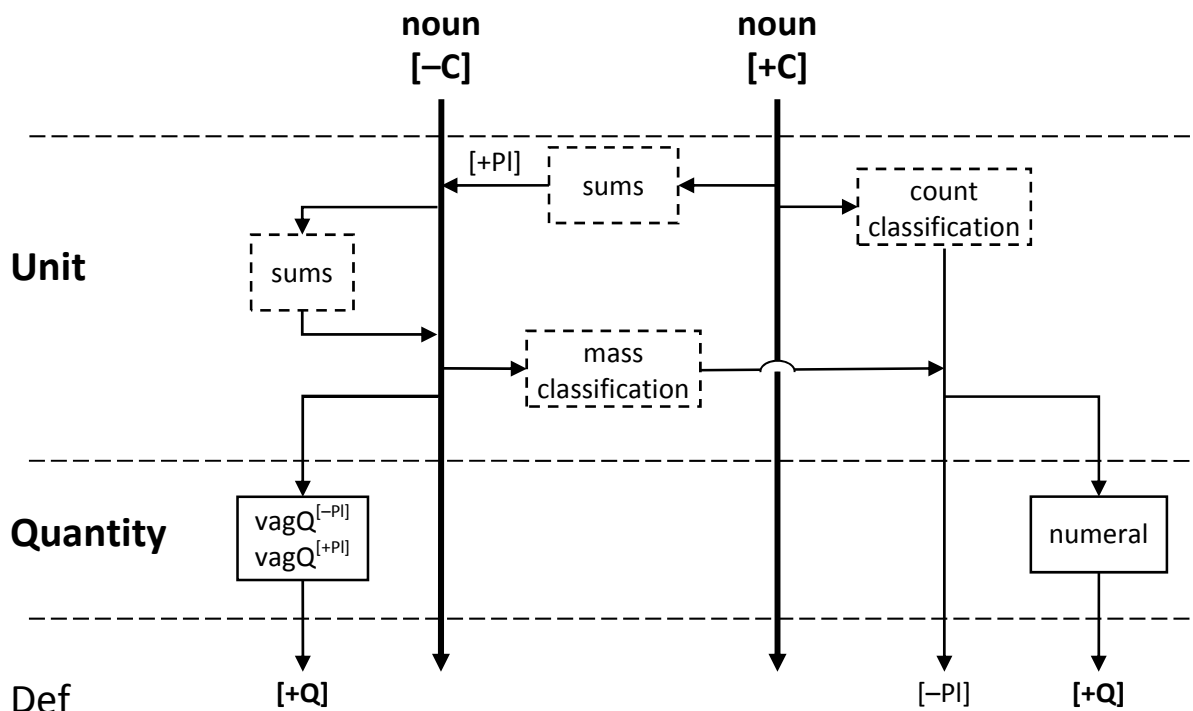
The numeral is applied to a singular concept, whose reference is multiplied by the numeral. There are also number languages such as Hungarian in which all numerals are combined with singular nouns (20b); the plural marking in number languages like English can be attributed to a mechanism of semantic agreement between the numeral and its operand.

- (20) a. (Mandarin)  
zhè dòng fángzi  
DEM CCLS house  
'this house'
- b. (Hungarian, Ugric, Uralic)  
két ház  
2 house.SG  
'two houses'
- c. (Hungarian)  
a ház-ak  
DEF house-PL  
'the houses'

If a Qt operation is applied, the nominal acquires a feature [+Q] which corresponds to a quantity attribute in the nominal concept for which a value is specified; note that  $\Sigma$  is not a Qt, but a Unit operation. The feature [+Q] makes the nominal eligible for quantificational use (see 4.7.2). Without a quantity element, the nominal may take on simple indefiniteness marking (if the language provides any, see 3.6.1); the nominal will carry a [C] and a [Pl] feature, resulting from its Nucleus properties and operations at the level Unit.

Figure 2 gives the overall picture of the operations and features involved on the Unit and Quantity layers. According to the diagram, bare nominals in languages without articles and number distinction may be [-C] or [+C] with or without  $\Sigma$  application.

**Figure 2** Operations of the levels Unit and Quantity



### 3.5 Order

A criterion of order can be applied to a nominal at the stage reached now, based on various types of ordering. These include:

- numerical order *first, second, ...*
- temporal order *next, former, first, last, new, old*
- order by a specific scalar criterion *superlatives*
- order by subjective preference *favourite*

Any type of ordering requires an operand concept denoting a *set* of entities to be ordered; the operands must hence be [-U]. Ordering conceptually identifies one element in the set; therefore, the result of applying an ordering operator to a [-U] operand is [+U]: concepts such as ›third/next/most boring/favourite book(s)‹ are inherently unique. If the operand is [-PI], the entities to be ordered are singular referents; if the operand is [+PI], the ordered entities are sum referents. The operand may carry quality and quantity specifications such as in (21):

- (21)      the   first/best/next   two   Iranian   movies  
              her   favourite           two   Iranian   movies  
              Def   Ord                   Qt   Qual   Nuc

The operators ›new‹ and ›old‹ in the list above have to be taken in the sense given in (22a), not as restrictive adjectives on the Qual layer (22b):

- (22) a.    The new pope is more popular than the old one.  
        b.    This T-shirt is still quite new/already very old.

The operator ›favourite‹ requires an experiencer argument; it thus adds a [+R] quality to the nominal. Among the operators mentioned, *favourite* and *new* have been analysed in Partee and Borschev (2002); on superlatives, see Sharvit and Stateva (2002).

The application of ordinal numerals requires the same path as cardinal numerals. In numeral classifier languages, an ordinal morpheme is attached to the combination of cardinal numeral and classifier, cf. Mandarin *dì* 第 'number' in (23):

- (23)      dì           sān      dòng   fángzi  
              number   CARD   CCLS   house  
              'the third house'

### 3.6 Definiteness

The approach taken here follows the theory of definiteness developed in Löbner (1985) and (2011), where the reader will find the relevant discussion of other theories of definiteness. According to this approach, the basic function of definite and indefinite determination, explicit or implicit, is to invest the NP with [+U] or [-U] status, respectively. In languages without definiteness marking, bare NPs will carry the lexical [U] feature of the nucleus through to the level of the NP. Thus bare nominals with a [-U]/[+U] nucleus will end up indefinite/definite unless they are modified by a covert operation that changes the [U] value.

In addition to Def operators, there are prior operations that affect [U]. These include:

- A shift to [-U] effected by existential possessor saturation.

- Coercion of a lexical shift to [-U] by application of operands of the Qual, Unit or Qt layers.
- Order specifications, which require [-U] and shift to [+U] (4.5).

The [U] feature is also affected by possessor specifications in a possessive chain. This complex will be discussed in 3.6.2.

### 3.6.1 Definiteness operations on absolute nominals

**From [-U] to [-U] (1): simple indefinites.** Simple indefiniteness adds no semantic content to the nominal. If overt, it is used on [-U] nominals that do not carry the [+Q] feature; it may depend on the features [C] and [Pl]. French has three simple indefinite markings: *un* for [+C][-Pl], *du/de la* for [-C][-Pl] and *des* for [+Pl]. English only marks [+C][-Pl] with *a(n)*. Mandarin has optional marking of indefinites by *yǒu* 有. *Yǒu* can be attached to a nominal on the Qual level, to a bare classifier plus nominal in colloquial Mandarin (yielding a one-unit meaning), or to a nominal with numeral and classifier. *Yǒu* is not sensitive to the features [C] and [Pl].

**From [-U] to [-U] (2): special indefinites.** What I would like to call 'special' indefinites include the following elements in English.

- unspecific indefinites: *some* (not as a vague quantity specification)
- free choice indefinites: *any*
- negative indefinites: *no*
- interrogative indefinites: *which*

In English, none of these are sensitive to the features [C] and [Pl].

**From [-U] to [+U] (1): demonstratives.** Adnominal demonstratives are very widespread. We will not discuss their deictic properties (see Diessel 2012), but only their interaction with the [U] feature. Generally, they presuppose the possibility of choice among potential referents of the nominal; thus, they operate on [-U] nominals. The result, however, is [+U]: nominals with adnominal demonstratives have definite reference. In many languages, such as Hungarian, demonstrative determiners combine with definiteness marking, as in

- (24)      *az      a      ház*  
              DEM DEF house.SG  
              'this house'

The shift to [+U] is enabled by an accompanying gesture of pointing, or more abstract processes amounting to the effect of singling out a referent in the given context of utterance.

**From [-U] to [+U] (2): pragmatic definites.** The most prominent case of applying definite determination is its operation on [-U] nominals such as, e.g., with anaphors.

- (25)      Sue wrote a letter to Juliet, but the letter never arrived

I have called this use of definites 'pragmatic' because the uniqueness involved with this type of definites is achieved at utterance level by retrieving information from the given context. The information must be such that the resulting concept is of type [+U]; i.e., conceptually enriched so as to yield a unique description. In the example in (25), the semantic concept

›letter‹ of the anaphoric NP *the letter* is enriched to ›letter Sue wrote to Juliet‹ with reference to the same writing event as in the preceding sentence. This amounts to a unique description in the given context. The conceptual enrichment involved can also be effected by a so-called 'establishing relative clause' (Hawkins 1978:131ff), as in (26):

(26) The letter *that Sue wrote to Juliet* never arrived.

The identifying information that is retrieved either implicitly from the context or explicitly from the establishing relative clause is to be considered content of the resulting definite NP concept at utterance level, since it is presupposed in both cases. We will therefore represent this shift as an operation involved with pragmatic definites.

**From [±U] to [+U]: determiner possessives.** In many languages, certain possessive constructions have the combined effect on the possessum of possessor specification and definite determination. As mentioned in 3.1.2, this applies to English Saxon genitives and NPs with possessive pronouns, but not to Italian NPs with possessive pronouns (recall (14) and (15)). This operation equally applies to [−U] and [+U] input, i.e., to relational and functional CNPs.

**From [+U] to [+U]: semantic definites.** Definiteness marking for [+U] nominals is semantically as redundant as simple indefiniteness marking with [−U] nominals; both may serve other functions such as case marking or just syntactic uniformity. I have called definites with [+U] CNP 'semantic' definites because the uniqueness requirement for definite NPs is met by the very semantics of the CNP. Many languages, including Mandarin and Russian, do not mark definite NPs. English does mark definiteness, but not for all [+U] nominals, as it does not use a definite article with (most) proper names and personal pronouns. There are also cases of 'bare definites' where [+U] nouns receive no definiteness marking, as in *go to school*, *go to bed* or *at night*. For colloquial German and standard Modern Greek, the use of definite articles extends to proper names; Maori, in addition, even marks personal pronouns as definite (Bauer 1993:108ff.). Some languages distinguish between pragmatic and semantic definiteness. For example, German dialects have 'weak' articles that are exclusively used with semantic definites (see Löbner 2011:318f).

**From [+U] to [−U]: quantification proper.** This operation will be discussed in 3.7.

### 3.6.2 Definiteness operations on relational nominals

As mentioned in 2.3, [+R] nominals may be [+U] or [−U]. Except for determiner possessives, possessor specifications operate on the nominal on the Rel layer prior to Def. On the Def level, the relational possessum CNP, to be referred to as 'REL', undergoes definite or indefinite determination. This step applies independently of the [U] quality of the possessor POSS. If REL is [+U], it is eligible to semantic definiteness marking, e.g., in *the mother of a boy*. If REL is [−U] it can be determined as indefinite, as demonstrative or pragmatically definite. The whole complex of REL+POSS will take on a [U] character that depends on the [U] features of both, REL and POSS, as indicated in (27).

(27)		REL		POSS		REL+POSS
	a.	a brother	[-U]	of a boy	[-U]	→ [-U]
	b.	a brother	[-U]	of the boy	[+U]	→ [-U]
	c.	the mother	[+U]	of a boy	[-U]	→ [-U]
	d.	the mother	[+U]	of the boy	[+U]	→ [+U]

REL+POSS is [-U] if REL or POSS is, since all three combinations in (a) to (c) are sortal concepts that allow for an open number of potential referents (for more discussion see Löbner 2011:301ff on the [U] feature of possessive chains).

### 3.7 Quantification proper

In this chapter, we will merely discuss the way in which nongeneric ('particular' or 'episodic') quantification fits into the whole architecture of determination; for a comprehensive discussion of quantification see chapter 20.

Nongeneric quantification proper can be considered a differentiation of an underlying summative predication about the domain of quantification, DoQ (see Löbner 2000: 253–277 for an extensive discussion). For nominal quantification, the domain of quantification is a sums domain, as indicated in (28); the predication to be quantified in the next step (the 'nuclear predicate') applies distributively.

(28)	single case	summative predication on the sum of single cases
	a. mass:	the coffee [ $\Sigma(\text{coffee})$ ] was served in paper cups.
	b. singular:	the eggs [ $\Sigma(\text{egg})$ ] are broken.
	c. plural:	the students [ $\Sigma(\Sigma(\text{student}))$ ] gathered in their classrooms.

The arguments of the VP predicate are of type  $\Sigma$ ; hence the VP predicate  $p$  itself is raised to  $\Sigma(p)$ . Since sum predicates are summative, they are either true of all elements of their sum argument or false of all elements. Summative predication thus gives rise to truth value gaps for sum arguments that contain both, elements for which  $p$  is true and ones for which  $p$  is false. If, however, quantification is applied to such a case of summative predication, it turns  $\Sigma(p)$  into an integrative predication on the DoQ that specifies the quantity of elements in the sum for which the predication is true. Integrative quantification thus fills the functional gap of predicating about possibly 'mixed' sum arguments. One option of applying quantification (in some, but not all languages) is by means of nominal determination; the other, more common way, is by the use of quantificational adverbs such as *partly* or *completely* (Bach 1995:10). For nominal quantification there are two options: the use of genuine quantificational determiners and the use of explicit quantity specifications. In both cases, quantificational determination in English is sensitive to the distinction in terms of [C] and [Pl].

#### 3.7.1 Genuine quantifiers

In (29) we apply universal quantification to the sum(mative) predications in (28):

(29)	single case	quantification
	a. mass:	All coffee was served in paper cups.
	b. singular:	Every/each egg was broken
	c. plural:	All students gathered in their classrooms.



The truth value gaps for mixed domains are now closed: mixed cases just yield falsity. In English, *every*, *each*, *both*, *either* and *neither* are used for  $\Sigma$ (singular) quantification, while *all* applies to  $\Sigma$ (mass) and  $\Sigma$ (plural).

Nongeneric quantification always presupposes reference to the sum DoQ. This becomes apparent if one observes the equivalence of the partitive paraphrases for the sentences in (29); such a paraphrase is always possible with episodic nominal quantification:

- (30)      single case      explicitly partitive quantification
- a.   mass:                All of the coffee was served in paper cups.
  - b.   singular:            Everyone/each of the eggs was broken
  - c.   plural:                All of the students gathered in their classrooms.

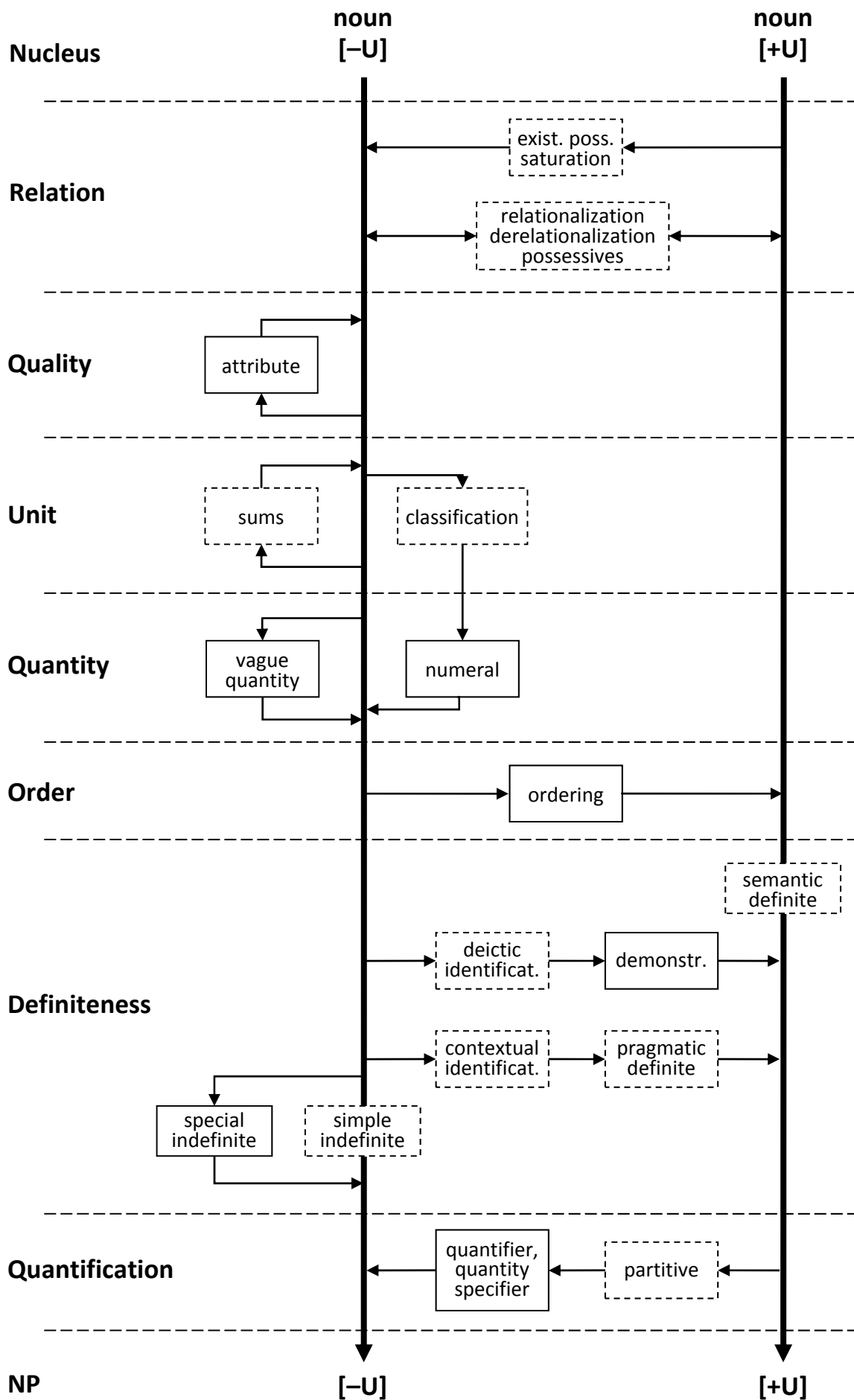
The partitive paraphrases show that quantification actually involves two operations on the definite sum DoQ: (1) a partitive on a [+U][−C] nominal, (2) application of a quantificational determiner. The partitive is an inverse of the sums operation; it yields elements of the sum for application of the quantified predicate. The result is a shift from [+U] to [−U] since quantificational NPs are not definite (recall 3.6.1).

### 3.7.2 Partitive indefinites

In addition to genuine quantifiers, quantity operators, i.e., numerals (with classifiers) and vague quantity specifications, can be used as Qf determiners. These operators are nongeneric quantifiers proper if and only if they are construed as partitive indefinites (see Löbner 1987:190ff, Löbner 2013:85f).

- (31)      single case      [partitive] quantification
- a.   mass:                Much [of the] coffee was served in paper cups.
  - b.   singular:            Three [of the] eggs were broken.
  - c.   plural:                Many [of the] students gathered in their classrooms.

**Figure 3** Operations of determination on the seven layers



## 4 Concluding remarks

The overall picture of [U] determination on the Order, Definiteness and Quantification layers is illustrated in Figure 3. In a simplified manner, the diagram also includes the operations on the preceding layers from Relation to Quantity.

The considerations above amount to a complex model of the various semantic operations involved in forming an NP out of a nominal nucleus. The model depicts the relative order of determinational operations, whether they are optional or necessary, and whether they can be covert in a language or not. It also models the way in which the operations of determination interact with the three basic features of nominals—relationality, countability and uniqueness. The model accounts for possible readings of NPs with no overt determinational elements. Such a 'bare' nominal may have passed through any series of operations that can be applied covertly; these include derelationalization, contextual possessor identification, relationalization,  $\Sigma$ , count and mass classification, simple indefiniteness and definiteness. If we take a look at the steps not marked as potentially covert, we realize that these coincide with those operations that add content beyond mere determination: explicit possessor specification, quality modification, quantity specification, ordering, deictic relation, special types of indefiniteness and quantification proper.

Of course, the model is only a general frame; it does not capture all possible interactions within it, and it does not tell how these functional layers are dealt with in syntax. It does, however, offer a way to locate all essential operations of semantic NP formation in one coherent model.

## Further reading

Doetjes (2012) on the mass/count distinction; Corbett (2000) on number; Barker (2011) on relational nouns; Löbner (2011) on relationality and inherent uniqueness; Rijkhoff (2002) for the greater part of the issues discussed, from a typological perspective. Svenonius (2008) for a recent survey of approaches to NP-internal layers, and on a subclassification of adnominal adjectives.

## Related topics

Chapter 20 Quantification.

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